REMARKS

The claims are 1 to 5. All claims stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 5,602,361 to Hamilton and Baglini, in view of U.S. Patent 6,228,192 to Neidert, Scheffee, Bowman, and Martin, and U.S. Patent 6,607,618 to Manning and Prezelski. It is the Examiner's position that the Hamilton and Baglini reference discloses known gun-type propellants that comprise 76.6% of 13.25% nitrocellulose, 20% of a plasticizer such as nitroglycerin, 0.6% of ethyl centralite, and 0.4% graphite. The Examiner has also noted that acetyl triethyl citrate is shown with other gun propellants.

The Neidert, *et al.*, reference is cited as teaching the use of BuNena as an energetic plasticizer for nitrocellulose, and it is the Examiner's position that the reference teaches the equivalence of BuNena to nitroglycerin.

Finally, the Examiner cites the Manning and Prezelski reference as disclosing the use of a mixture of nitrocellulose with a 12.6% nitrogen content with nitrocellulose with a 13.35% nitrogen content. In addition, the reference is cited to show the use of additives such as graphite, potassium sulfate, and Candelilla wax in gun propellants.

It is the Examiner's view that it would have been obvious to modify the gun propellant of the Hamilton and Baglini reference, using acetyl triethyl citrate with ethyl centralite and graphite, but substitute BuNENA for nitroglycerin as the plasticizer, as

taught by the Neidert *et al.,* reference, and, further, modify the nitrocellulose as taught by the Manning, *et al.,* reference.

This rejection is respectfully traversed in its entirety for the reasons that follow.

United States Patent 5,602,361 to Hamilton and Baglini is entitled Hybrid Inflator. It is concerned with a hybrid inflator for an automotive inflatable safety system. The system of the reference provides a gun type propellant as a gas generator combined with a mixture of gases, including the necessary oxygen to complete combustion of the propellant gases, so that the hydrogen and carbon monoxide liberated by the gas generator can be further oxidized to harmless water and carbon dioxide. In doing so, the reference discloses the composition of a double base, smokeless propellant with the composition cited by the Examiner. This composition, HPC-96, is primarily nitrocellulose and nitroglycerin, with ethyl centralite, barium nitrate, potassium nitrate, and graphite. Acetyl triethyl citrate is not employed in this composition. It is employed in a completely different propellant, M39 LOVA, but that propellant contains 76% RDX in a cellulose acetate butyrate binder. Only 4% of the composition is nitrocellulose. Acetyl triethyl citrate is not shown in a nitrocellulose-based propellant composition is this, or any other, reference.

United States Patent 6,228,192 to Neidert, Scheffee, Bowman, and Martin is entitled Double Base Propellant Containing 5-Aminotetrazole. This reference discloses a family of propellant compositions containing nitrocellulose plasticized with nitrate esters,

a thermal stabilizer, carbon, and an energetic solid. There is no suggestion of a mixture of a nitrocellulose with a 12.6% nitrogen content with a nitrocellulose with a 13.25% nitrogen content, and the nitrocellulose content is below 40%. There is no ethyl centralite or acetyl triethyl citrate. Carbon black is present, but so is an energetic solid filler, 5-aminotetrazole and its derivitives, in a proportion of five to thirty-five percent.

United States Patent 6,607,618 to Manning, a common inventor with the present application, and Prezelski is entitled Propellant Compositions. The compositions shown therein comprise about 52% nitrocellulose which is a mixture of nitrocellulose having a 12.6% nitrogen content and a nitrocellulose having a 13.35% nitrogen content; 34 to 35% diethylene glycol dinitrate (DEGDN), a nitroester-based plasticizer; 3 to 4% di-normal propyl adipate (DNPA), a non-nitroester-based plasticizer; and 7% nitroguanidine (NQ). Additives, such as Graphite, Potassium Sulfate, Ethyl Centralite and Candelilla wax, are also shown. There is no acetyl triethyl citrate.

The present invention is a nitrocellulose-based single-base propellant, containing neither the nitroglycerin of the Hamilton and Baglini reference, the 5-aminotetrazole of the Neidert, *et al.*, reference, or the nitroguanidine of the Manning and Prezelski reference. This is a significant difference in that while inert plasticizers reduce sensitivity, they also reduce performance. Energetic plasticizers, on the other hand, typically enhance performance, but with an accompanying increase in sensitivity. As noted in the present specification, at paragraph 26, BuNena – unlike other plasticizers used in the art –

imparts an increase in energy and reduced sensitivity. It is officially classified as a flammable liquid and not an explosive.

Neidert, *et al.,* employes a class of nitrate esters, and that class includes BuNena, but that reference discloses a double-base propellant with a substantial (5 to 35 weight%) energetic solid loading. Any loss in energetic performance caused by substituting a nitrate ester plasticizer for nitroglycerin would be compensated by the addition of an energetic solid. Nowhere, within the four corners of the document, is it suggested that BuNena is the equivalent of nitroglycerin.

Finally, nowhere in any of the references, is there a suggestion that acetyl triethyl citrate be used in a nitrocellulose-based propellant composition, and certainly not a nitrocellulose-based single base propellant.

Nor, it is submitted, is the design of an effective propellant a matter of a menu selection: one from column A and two from column B. In addition to achieving a balance of energetics with appropriate performance and flame temperature, there are many additional considerations. The Neidert, *et al.*, reference sets out some measure of this difficulty:

"The prior art, therefore, has failed to disclose a family of gas generating compositions useful as propellants in aerospace applications that has a stable component formulation characterized by low sensitivity, a flame temperature less than 3050° F.,

combustion exhaust products with optimum system compatibility, optimum ballistic properties and increased working life, and that can be formulated cost effectively from available components."
(U.S. Patent 6,228,192, at Column 2, lines 17 to 24).

If these considerations were not enough, in recent years other concerns have impacted upon the materials and methods for the production of energetics. These considerations are detailed in the current specification in paragraphs 5 through 9, and include the environmental compatibility of the raw material components, the solvents used in processing, and the reaction by-products of the ignition of the energetic.

In such an environment, the design of an effective energetic would require more that the mere mention of a particular compound in passing in a prior art reference.

It is submitted therefore, that the rejection of the present claims over the art of record is not well taken, and should be withdrawn. It is expressly solicited, therefore, that the present claims be reexamined and passed to issue.

WHEREFORE, in consideration of the above Remarks, reexamination and allowance are respectfully requested.

Respectfully,

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